

# Simplicial surfaces in GAP

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- 1 General polygonal complexes by incidence geometry
- 2 Edge colouring and group properties
- 3 Abstract folding

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# Motivation

Goal: simplicial surfaces (and generalisations) in GAP



⇝ examples of **polygonal complexes**

# No embedding

We do not work with embeddings (mostly)

- is very hard to compute
- if often unknown for an abstractly constructed surface
- is different from *intrinsic structure*

⇒ lengths and angles are not important

↪ incidence structure is intrinsic

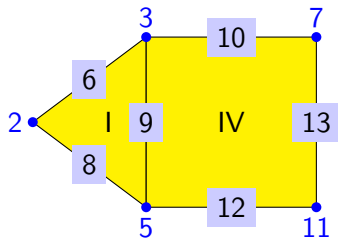
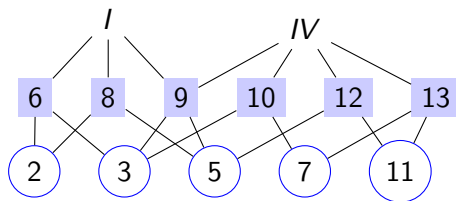
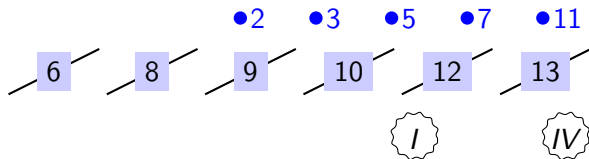
# Incidence structure

- set of vertices  $\mathcal{V}$

- set of edges  $\mathcal{E}$

- set of faces  $\mathcal{F}$

- transitive relation  $\subseteq (\mathcal{V} \times \mathcal{E}) \uplus (\mathcal{V} \times \mathcal{F}) \uplus (\mathcal{E} \times \mathcal{F})$



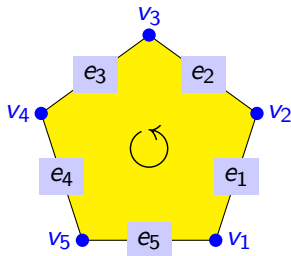
# Polygonal complexes

A **polygonal complex** is a two-dimensional incidence structure of vertices, edges and faces, such that:

① Every edge has exactly two vertices.



② Every face is a polygon.



③ Every vertex lies in an edge

④ Every edge lies in a face

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